

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Mark Schemes

Q1.

Question number	Answer	Additional guidance	Mark
(i)	calculation of both moments (1) moments are equal (size) and opposite direction (1)	4 x 92 and 16 x 23 seen comparison of both moments 368 (=) 368 or $4 \times 92 = 16 \times 23$ or $16 = \frac{4 \times 92}{23}$ or $4 = \frac{16 \times 23}{92}$ accept calculations in Nm	(2) AO1, AO2

Question number	Answer	Additional guidance	Mark
(ii)	calculation of moment of ball (1) 480 (Ncm) calculation of total clockwise moment (1) 848 (Ncm) calculation of bicep force needed (1) 212 (N) OR calculation of moment of ball (1) 480 (Ncm) calculation of additional force from bicep (1) 120 (N) calculation of total bicep force (1) 212 (N)	15 x 32 seen 368 + 480 seen 848/4 seen 15 x 32 seen 480/4 seen 120 + 92 seen award full marks for correct answer without working. accept conversion of cm to m throughout	(3) AO2

Question number	Indicative content	Mark
	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive, and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. A01 Horizontal forces • tension in the string/pull of the string • tension is one of the horizontal forces acting on the wooden block • friction between the table and the wooden block • friction acts in the opposite direction to the tension • friction opposes motion • the force due to friction is equal to the force provided by the tension • the forces are balanced /equal and opposite • no resultant force, so the block moves at a constant (horizontal) velocity	(6)
	Vertical forces • (normal) reaction (force) upwards between the table and the wooden block • contact force • weight of block downwards • the weight (force of gravity) and the (normal) reaction are equal and opposite / balanced • the block does not move up or down • tension caused by the force due to gravity on the weight • vertical forces on the block do not affect horizontal velocity. labels on the diagram should be considered when marking candidates do not have to indicate the forces as horizontal and vertical	

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	- Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) - Presents an explanation with some structure and coherence. (AO1)
Level 2	3-4	- Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) - Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	- Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) - Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

Level	Mark	Additional Guidance	General additional guidance – the decision within levels
	0	No rewardable material.	e.g. - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
Level 1	1–2	<u>Additional guidance</u> Elements of physics present i.e. isolated knowledge of principles two unconnected statements from any section	<u>Possible candidate responses</u> contact force weight pulls block friction tension in string weight acts downward reaction
Level 2	3–4	<u>Additional guidance</u> Some knowledge of principles with a logical connection made in one section and statement from the other section OR Detailed knowledge of principles with logical connections made in one section	<u>Possible candidate responses</u> There is friction between the table and the block and this opposes motion weight of block acts downwards
Level 3	5–6	<u>Additional guidance</u> Detailed knowledge of principles with logical connections made in one section and statement from the other section	<u>Possible candidate responses</u> Friction and tension are equal and opposite there is no resultant /no acceleration The weight (of the block) and the(normal) reaction are equal and opposite

Q3.

Question number	Answer	Additional guidance	Mark
	an explanation linking distance from hinge/pivot increased (1) (therefore) smaller force needed (to close door)	P further from hinge than Q accept the greater distance gives greater moment for 2 marks	(2)

Question Number	Answer	Additional guidance	Mark
(i)	recall of moment = force x distance (1) (moment of force from person =) 600×0.5 and (moment of weight of rock =) 1800×0.2 (1) moment of force from person is less than moment of weight of rock. (1)	may be implied in a calculation 300 (Nm) and 360 (Nm) independent mark accept reverse argument	(3)

Question Number	Answer	Additional guidance	Mark
(ii)	An explanation that links increase distance between person and pivot/ reduce distance between rock and pivot / increase force from person (1) increase the moment of the force from the person / decrease the moment of the weight of the rock (1)	use longer lever / hold lever nearer the end / move pivot nearer to rock / get someone to help to push value of new distance and calculation of new moment	(2)